Statement of Finding for Galveston Harbor and Channel and Houston Ship Channel Dredging Project, 10 January 2012

1. Sediment chemistry data for project samples indicated the presence of low levels of dioxins and furans (0.46 to 5.4 pg/g dw TEQ). These levels do not reflect significant point source contributions of dioxins/furans to the project area but rather reflect the low level dioxin/furan contamination that is ubiquitous in environmental media throughout the United States, including coastal areas.
2. Bioaccumulation tests were performed using two species: the polychaete *Nereis virens* and the bivalve *Macoma nasuta*. Results indicated that low levels of dioxins/furans (0.04 to 0.24 pg/g ww TEQ) were accumulated from project sediments, consistent with the sediment chemistry data.
3. There was no spatial trend (i.e., gradient) or hotspots evident in the sediment or bioaccumulation chemistry data. The dioxin/furan levels in all project samples were consistent with the widespread presence of low ambient levels in Galveston Bay.
4. Dioxin/furan present in the tissue of test animals (which are field collected) prior to testing with project sediments was 0.12 pg/g ww TEQ for *N. virens* and 0.051 pg/g ww TEQ for *M. nasuta*. *N. virens* and *M. nasuta* exposed to reference sediment accumulated a mean of 0.31 pg/g ww and 0.049 pg/g ww, respectively. These values reflect the low background levels of dioxins/furans in coastal sediments. The TEQs of dioxins/furans accumulated by test organisms exposed to project sediment were compared statistically to those accumulated by organisms exposed to reference sediment. Dioxin/furan concentrations measured in *N. virens* exposed to project sediment did not statistically exceed reference accumulations in any treatment. Two of the 18 project sediments (GC-11-01 and H-BR-11-01) resulted in dioxin/furan accumulations that were statistically higher than in reference sediment exposures. Mean TEQ concentration in tissue of *M. nasuta* exposed to sediment from site GC-11-01 was 0.11 pg/g ww and was 0.11 pg/g ww for *M. nasuta* exposed to sediment from site H-BR-11-01.
5. Tissue concentrations of hydrophobic compounds (where log Kow is > 5.0) determined using 28-day bioaccumulation tests require a correction for steady state to estimate risk and for comparison to background concentrations from field collected animals. Steady state is a condition where the chemical is in equilibrium and has reached a stable concentration. Dioxin and furan values in *M. nasuta* tissues require a steady state factor or multiplier ranging from 1.2 to 3.0 (Kennedy et al., 2010). Other studies have suggested that no steady state adjustment is required (Pruell et al, 1990, 1993). The range of steady state adjusted values is show in Table 1 below.
6. Dioxins/furans are consistently found at low levels in all environmental matrices in the United States. Background concentrations measured in field-collected benthos were used to determine whether the concentrations of dioxin/furan accumulated by *M. nasuta* in the two project reaches were environmentally significant. Two sets of ambient data that are routinely by USACE South Atlantic District/EPA Region 4 to make dredged material suitability determinations and a dataset of TEQs measured in Pensacola Bay ambient oyster tissue (Karouna-Renier) were used. All project sediment bioaccumulation exposures that exceeded reference sediment exposures, including adjustment for steady state, did not exceed ranges of dioxins/furans measured in ambient field-collected organisms.

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7. Based on the above, the Dioxin Technical Team find these dioxin/furan levels reflect normal ambient concentrations and pose no regulatory concern specific to CFR 227.27. Further, absent a change in conditions, these data indicate that there is no need for future dioxin and furan testing in these project sediments.

Table 1. Comparison of statistically significant TEQ of dioxins/furans accumulated by *N. virens* and M*. nasuta* in this study to ambient coastal concentrations.

Study	**Central Tendency (pg/g ww)**	**Range (pg/g ww)**
Bivalve		
M. nasuta, all sites, this study	0.07 (median)	0.041 – 0.15
M. nasuta, GC-11-01, this study	0.11 (mean)	0.07-0.15
M. nasuta, H-BR-11-01, this study	0.11 (mean)	0.09-0.14
M. nasuta, GC-11-01, this study with SS correction factor (Kennedy, 2010)	Na	0.12-0.33
M. nasuta, H-BR-11-01, this study with SS correction factor (Kennedy, 2010)	Na	0.12-0.33
bivalve, SAD/Reg 4, S. Atlantic Bight	na	0.32 – 0.36
bivalve, SAD/Reg 4, N. Gulf of Mexico	na	0.16 – 0.19
Oysters, Karouna-Renier, 2007, Pensacola Bay, FL	0.9 (mean)	0.29-5.9
Worm		
N. virens, all sites, this study	0.12 (median)	0.05 - 0.24
N. virens, SAD/Reg 4, S. Atlantic Bight	na	0.18-0.44
Polychaete, SAD/Reg 4, N. Gulf of Mexico	na	0.31-0.63

Note: all data provide above are dioxin/furan TEQ wet weight (ww); steady state adjusted values were calculated by multiplying the mean with the lowest (1.2) and highest (3.0) steady state adjustment factors from Kennedy et al, 2010.

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